

Formation of schoolchildren's creative activity on the final stage of solving a mathematical problem

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Abstract

© 2017 Authors. The aim of the research is to study the possibilities of the final stage of working with a mathematical problem as a means of forming schoolchildren's creative activity. The leading method of investigating this problem is to establish the correspondence between the components of the final stage of working with the mathematical problem and the procedural features of the student's creative activity. The study resulted in defining the structure of the final stage of working with a mathematical problem, which made it possible to identify a certain set of activities that make up the ability to work with the problem on the final stage of its solution. The article establishes the relationship between actions appropriate to this stage of work with the task and signs of the student's creative activity. It is proved that in the process of working with the problem on the final stage of its solution, students develop procedural features of creative activity. The author's method of forming students' creative activity suggested in the article can be used by the teachers of mathematics in school practice, by the authors of methodological manuals for students and teachers, and also can be used as the basis for a special course for students of pedagogical universities.

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Keywords

Mathematical problem, Signs of creative activity, The formation of creative activity

References

- [1] Adamar, J. (1970) Investigation of the psychology of the invention process in the field of mathematics. Moscow: Sov. Radio
- [2] Aksyutina I. V., & Shuklina, Y. A. (2014). Problems of forming creative activity in teaching mathematics in the practice of school training. *Primo Aspectu*, 19(24) (151), 183-185
- [3] Aksyutina, I. V., & Shuklina, Y. A. (2013) Forming creative activity in teaching mathematics with using illustrative and practical works. *Engineering and construction bulletin of the Caspian Region*, 2(3-6), 77-79
- [4] Artemov, A. K. (1973). On heuristic methods for teaching geometry in school. *Mathematics in school*, 6, 25-29
- [5] Azarova, T. G. (2012). Entertaining tasks as a means of forming creative activity of junior schoolchildren in teaching mathematics. *Works of Young Scientists of Altai State University*, 9, 304-306
- [6] Bahar, A., & Maker, C. J. (2015). Cognitive Backgrounds of Problem Solving: A Comparison of Open-ended vs. *EURASIA Journal of Mathematics, Science and Technology Education*, 11(6), 1532-1546. doi:10.12973/eurasia.2015.1410a

- [7] Balk, G. D. (1969). On using heuristic techniques in the school teaching of mathematics. *Mathematics in School*, 5, 21-28
- [8] Collis, K. F., Watson, J. M., & Campbell, K. J. (1993) Cognitive functioning in mathematical problem solving during early adolescence *Math Ed Res J.*, 5, 107-121. doi:10.1007/BF03217190
- [9] Czarnocha, B., & Dias, P. (2016) *The Creative Enterprise of Mathematics Teaching Research*. Rotterdam
- [10] Gnedenko, B. V. (1979). On mathematical creativity. *Mathematics in school*, 6, 16-22
- [11] Gorbacheva, N. V. (2001). Method of analogy as a means of developing creative thinking of students when teaching them elements of spherical geometry: Dis. cand. ped. sciences. Omsk
- [12] Gorev, P. M., & Rakhmatullina A. O. (2016). Training creative thinking for 5th and 6th grades in the educational strategy of the continuous formation of schoolchildren's creative thinking. Scientific and methodical electronic magazine "Concept", 26. <http://e-koncept.ru/2016/76339.htm>
- [13] Gorev, P. M. (2011). Introducing schoolchildren to the experience of creative activity in mathematics through a system of tasks realizing integrative connections. Scientific and methodical electronic magazine "Concept", 2. <http://e-koncept.ru/2011/11201.htm>
- [14] Gorev, P. M. (2011) Types of educational activity of schoolchildren and introduction to creativity in extracurricular work in mathematics. Scientific and methodical electronic journal "Concept", 1, 7-11
- [15] Gorev, P. M. (2012) *Imparting mathematical creativity: additional mathematical education*. Saarbrücken: Lambert Academic Publishing
- [16] Goryaev, N. A. (1997) Developing creative activity of students in teaching mathematics in secondary school in the system of enlarged didactic units. Dis. cand. ped. sciences. Moscow
- [17] Kablan, Z., & Kaya, S. (2013) Science achievement in TIMSS cognitive domains based on learning styles. *Eurasian Journal of Educational Research (EJER)*, 97-114
- [18] Kharitonova, I. V. (2015) Activating the creative potential of students using Web-technologies in teaching mathematics. Web-technologies in the educational space: problems, approaches, perspectives: a collection of articles of the participants of the International Scientific and Practical Conference. N. Novgorod: Rastr-NN, 341-347
- [19] Kolyagin, Y. M. (1977). Problems in teaching mathematics. Part I. Moscow: Education
- [20] Krupich, V. I. (1995). *Theoretical foundations of teaching the solution of school mathematical problems*. Moscow: Prometey
- [21] Kuznetsova, E. V. (1997). Entertaining tasks as a means of forming creative activity of students in 5-6 grades in teaching mathematics. Dis. cand. ped. sciences. Moscow
- [22] Laboratory and practical works on the methods of teaching mathematics. (1988). E. I. Lyashchenko, K. V. Zobkov, T. F. Kirichenko at al. Moscow: Education
- [23] Lerner, I. Y. (1974) *Problem training*. Moscow: Knowledge
- [24] Liljedahl, P., Santos-Trigo, M., Malaspina, U. & Bruder, R. (2016). Problem Solving in Mathematics Education. Hamburg
- [25] Maslova, S. V. (1996). Problems on the search of regularities as a means of forming creative activity of younger schoolchildren in teaching mathematics. Dis. cand. ped. sciences. Saransk
- [26] Napalkov, S. V., & Guseva, N. V. (2014). Web-technologies as pedagogical forms of familiarizing schoolchildren with creativity in the process of teaching mathematics. *Modern Problems of Science and Education*, 6, 768-774
- [27] Novoselov, S. A., & Kochnev, V. P. (2012). Conditions for the development of creative abilities of students in the process of teaching mathematics in the classes of the science profile. *Pedagogical Education in Russia*, 1, 58-66
- [28] Poya, D. (1991) *How to solve the problem*. Lvov: Quantor
- [29] Rosa, M., & Orey, D. C. (2012). A modelagem como um ambiente de aprendizagem para a conversão do conhecimento matemático. *Bolema: Boletim de Educação Matemática*, 26(42a), 261-290. doi:1590/S0103-636X2012000100012
- [30] Santos, J. G., & Silva, J. N. D. (2016). A Influência da Cultura Local no Processo de Ensino e Aprendizagem de Matemática numa Comunidade Quilombola. *Bolema: Boletim de Educação Matemática*, 30(56), 972-991. doi://10.1590/1980-4415v30n56a07
- [31] Sarantsev, G. I. (1995). Exercises in teaching mathematics. Moscow: Prosveshcheniye
- [32] Sarantsev, G. I. (2002). Methods of teaching mathematics in secondary school. Moscow: Prosveshcheniye, 224 p
- [33] Schwartzman, Z. O. (1987). Developing creative abilities of students at extracurriculum lessons of mathematics. *Educating pupils while training in mathematics*. Moscow: Prosveshchenie, 170-173
- [34] Semenov, E. E. (1995). Reflections on heuristics. *Mathematics in school*, 5, 39-43
- [35] Shvartsburd, S. I. (1964). On the development of students' interests, inclinations and abilities to mathematics. *Mathematics in school*, 6, 32-37

- [36] Sullivan, P., & Clarke, D. Problem solving with conventional mathematics content: Responses of pupils to open mathematical tasks. *Math Ed Res J.*, 4, 42-60. doi:10.1007/BF03217231
- [37] The Concept of the development of mathematical education in the Russian Federation (2013). *Rossiyskaya Gazeta*. <http://www.rg.ru/2013/12/27/matematika-site-dok.html>
- [38] The concept of the structure and content of general secondary education (in a 12-year school). (2000). *Mathematics in school*, 2, 6-13
- [39] Trincherio, R., & Sala, G. (2016) Chess Training and Mathematical Problem-Solving: The Role of Teaching Heuristics in Transfer of Learning. *EURASIA Journal of Mathematics, Science and Technology Education*, 12(3), 665-668. doi:10.12973/eurasia.2016.1255a
- [40] Tyuina, N. S. (2003). Forming analysis through synthesis as a technique of creative activity of younger schoolchildren in teaching mathematics. Dis. cand. ped. sciences. Penza
- [41] Weber, K., Radu, I., Mueller, M. et al. (2010). Expanding participation in problem solving in a diverse middle school mathematics classroom *Math Ed Res J.*, 22, 91-118. doi:10.1007/BF03217560
- [42] Zelenina, N. A. (1998). Creative activity of students in modern educational concepts. Humanization and humanitarization of mathematical education in the school and university. Saransk: Mordovia State Pedagogical Institute, 50-52
- [43] Zelenina, N. A. (2004). The final stage of solving geometric problems in the main school. Dis. cand. ped. sciences. Kirov
- [44] Zelenina, N. A. (2005). The structure of the final stage of solving mathematical problem. *Mathematical bulletin of pedagogical institutes and universities of Volga-Vyatks region*, 7, 205-214
- [45] Zelenina, N. A. (2006). Teaching students to work planimetric problem on the last stage of its solving. *Mathematical bulletin of pedagogical institutes and universities of Volga-Vyatks region*, 8, 205-214